

---

**From:** Garwin Yip - NOAA Federal <garwin.yip@noaa.gov>  
**Sent:** Wednesday, April 10, 2019 9:03 AM  
**To:** Evan Sawyer - NOAA Affiliate  
**Cc:** Cathy Marcinkevage  
**Subject:** Fwd:  
**Attachments:** Appendix A Spawner Timing Analysis.pdf

-Garwin-

---

*Garwin Yip*

Water Operations and Delta Consultations Branch Chief  
NOAA Fisheries West Coast Region  
U.S. Department of Commerce  
California Central Valley Office  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814  
Office: 916-930-3611  
Cell: 916-716-6558  
FAX: 916-930-3629  
[www.westcoast.fisheries.noaa.gov](http://www.westcoast.fisheries.noaa.gov)



----- Forwarded message -----

**From:** Noble Hendrix <[noblehendrix@gmail.com](mailto:noblehendrix@gmail.com)>  
**Date:** Tue, Sep 18, 2018 at 2:29 PM  
**Subject:** Re:  
**To:** Maria Rea <[maria.rea@noaa.gov](mailto:maria.rea@noaa.gov)>  
**Cc:** Eric Danner - NOAA Federal <[eric.danner@noaa.gov](mailto:eric.danner@noaa.gov)>, Rachel Johnson <[rachel.johnson@noaa.gov](mailto:rachel.johnson@noaa.gov)>, Howard Brown <[Howard.Brown@noaa.gov](mailto:Howard.Brown@noaa.gov)>, Garwin Yip <[garwin.yip@noaa.gov](mailto:garwin.yip@noaa.gov)>, <[sarah.gallagher@noaa.gov](mailto:sarah.gallagher@noaa.gov)>, Steve Lindley <[steve.lindley@noaa.gov](mailto:steve.lindley@noaa.gov)>

Hi all,

Please find attached a brief description of the statistical analysis that we conducted on April temperatures at Keswick and winter-run spawn timing from carcass data (Appendix A of the User Manual). The take-away is in the last figure in which the model predicts that spawn timing shifts earlier as April temperatures warm.

We conducted this analysis on monthly data, but we are currently analyzing 10-day bins using a different statistical model that is more appropriate for ordered categorical data. I should be able to provide an update on that effort by middle of next week or so. Perhaps we can huddle sometime after that time?

Best,  
Noble

On Tue, Sep 18, 2018 at 10:48 AM Maria Rea - NOAA Federal <[maria.rea@noaa.gov](mailto:maria.rea@noaa.gov)> wrote:

Thank you, Rachel and Eric. Yes, please Rachel if you can organize a huddle, as you say, that would be helpful. I am particularly interested in any retrospective analysis using existing data sets, as planning for manipulations at Shasta in cold water management is very tricky. If you have some information please coordinate through Sarah Gallagher and the SRTTG. It also would be helpful to bring to the new Sac Science collaborative.

Sent from my iPad

On Sep 18, 2018, at 9:13 AM, Eric Danner - NOAA Federal <[eric.danner@noaa.gov](mailto:eric.danner@noaa.gov)> wrote:

Maria,

I think Rachel makes a very good point here - the issue of temperature manipulations (beyond cold water to protect eggs) should be a focused topic of discussion. I am guessing there is considerable interest from stakeholders in Jim Anderson's adaptation to the Martin model, and there are related management issues regarding focusing warmer temperatures for green sturgeon, etc.

Eric

On Mon, Sep 17, 2018 at 10:49 PM Rachel Johnson - NOAA Federal <[rachel.johnson@noaa.gov](mailto:rachel.johnson@noaa.gov)> wrote:

Maria-

Looping in Noble and Steve L. My recollection of their analysis shows that temperatures in April predict spawn timing in winter run with warmer temperatures experienced in April driving later spawn timing. This "optimal timing of emergence for progeny" hypothesis that may drive spawn timing is likely functioning as a "false cue" presently since as you point out, Maria, temperatures are often dropped after adults make the decision to spawn (i.e., cooling off eggs and delaying emergence even more based on degree days necessary to develop). No one knows how these temperature manipulations on the adults may influence ultimate fitness in winter run. Understanding the adult spawning temperature cues and any consequences this has seems like an important line of research. I am willing to organize a science-center huddle on this to see if we can come up with a logical line of study with some of our existing tools and expertise. Perhaps Noble or Steve have additional insights given the data. Nice to see you at so many of the FED talks at the BDSC!

Cheers,  
Rachel

On Thu, Sep 13, 2018 at 2:45 PM, Maria Rea - NOAA Federal <[maria.rea@noaa.gov](mailto:maria.rea@noaa.gov)> wrote:  
Hi Rachel and Howard - -

As Howard approaches his new duties, it's important he wraps his mind around winter run viability issues to totally get the winter run vibe! As I mentioned to you, Rachel, Howard said he was wondering what was causing the shift in timing in winter-run spawning to later and later in time. Rachel, you said a leading theory is that because the SRTTG is deliberately running temperatures warmer in May to save cold water (that and temps in lake can't be well controlled in May, and ambient temperatures are rising), then fish may be sensing to delay spawning in order to have eggs hatch at perceived optimum time (e.g. in Sept). Of course when temperatures drop in June/July, eggs actually take longer to incubate, and emerge later.

You started thinking about how we could run an experiment. But really, haven't we already run that experiment over and over? Couldn't someone take this data set of spawning timing based on carcass counts and see if its correlated to temperature exposure in May by year (average, max, median, etc)? Perhaps this has already been done.

Feel free to tell me I am off track here - - just trying to get Howard to feel the winter-run vibe!  
- Maria

**Maria Rea**  
Assistant Regional Administrator, California Central Valley Office  
NOAA Fisheries West Coast Region  
[650 Capitol Mall, Suite 5-100](#)  
[Sacramento, CA 95814](#)  
(916) 930-3600  
[Maria.Rea@noaa.gov](mailto:Maria.Rea@noaa.gov)



**Find us online**

[www.westcoast.fisheries.noaa.gov](http://www.westcoast.fisheries.noaa.gov)



----- Forwarded message -----

From: **Maria Rea - NOAA Federal** <[maria.rea@noaa.gov](mailto:maria.rea@noaa.gov)>  
Date: Thu, Sep 13, 2018 at 2:31 PM  
Subject:  
To: Maria Rea <[maria.rea@noaa.gov](mailto:maria.rea@noaa.gov)>

Sent from my iPhone

--

\*\*\*\*\*

\*\*\*\*\*

Rachel C. Johnson, PhD  
Fisheries Ecology Division  
Southwest Fisheries Science Center  
National Marine Fisheries Service

&

University of California Davis  
Associate Researcher  
Office: Center for Watershed Sciences, Rm 2107  
phone: 831-239-8782

\*\*\*\*\*

\*\*\*\*\*

--

Eric Danner, Ph.D.  
Supervisory Research Ecologist  
Fisheries Ecology Division, Southwest Fisheries Science Center  
110 McAllister Way  
Santa Cruz, CA 95060  
831-420-3917  
<http://swfsc.noaa.gov/>

--

QEDA Consulting, LLC  
[noblehendrix@gmail.com](mailto:noblehendrix@gmail.com)  
206.300.5595

*Affiliate Faculty University of Washington*